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Brainstem hypothesis for autism

Site-specific impairment of a small brainstem structure, nucleus tractus solitarius (NTS), is a potential break-through finding in the understanding of autistic spectrum disorder (ASD). NTS serves as initial central synapse for most sensory information from the viscera, and a broad set of unusual physical findings that associate with the diagnostic behaviors of ASD are explicable on the basis of reduced visceral afference. An exaggerated inflammatory response in ASD associates significantly with aberrant behaviors, and parallels the observation of increased inflammation after experimental splenic deafferentation. Likewise, deafferentation of the laryngeal viscera of animals results in reduced glottal closing force, proposed mechanism for our finding of whisper in association with autistic vocal regression. Experimental impairment of NTS results in depressed motor and secretory function of the gastrointestinal tract, prominent in ASD. Hypoperfusion of extensive brain regions with "global dysregulation" of cerebral blood-flow (CBF) is well-documented in ASD, and might be expected to alter development and integrated function of higher regions of brain. Animal experiments show that NTS is important in autoregulation of CBF, and that artificial stimulation of NTS increases CBF. An unusual vascular microanatomy is seen to confer a dual vulnerability of NTS to injury via hypoxia but also to toxins from the bloodstream that tend to concentrate preferentially in regions of brainstem such as NTS that are unprotected by BBB. Hence, we consider specific hypoxic events and common toxic exposures that could act together or separately in order to trigger ASD at varied points in the neurodevelopmental sequence.

Biography

Woody R McGinnis was educated at Dartmouth College and the University of Colorado, USA. After volunteer work in rural Peru, his general practice in Arizona included treatment of many children with autism. McGinnis commenced full-time research in autism in 2001 under the auspices of the Autism Research Institute, San Diego. In 2009, the publication of 'Neurotoxic Brainstem Impairment as Proposed Threshold Event in Autistic Regression' by CRC Press as a chapter in Autism: Oxidative Stress, Inflammation and Immune Abnormalities established McGinnis as a leading thinker in brainstem and autism. He has worked closely with the Autism Tissue Program and the University of Maryland Brain and Tissue Bank to enhance the collection of brainstem, including preservation of midline structures such as NTS.

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